WS 2021/22

Efficient Algorithms and Data Structures

Harald Räcke

Fakultät für Informatik TU München

http://www14.in.tum.de/lehre/2021WS/ea/

Winter Term 2021/22

Organizational Matters

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► Modul: IN2003

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Name: "Efficient Algorithms and Data Structures"

"Effiziente Algorithmen und Datenstrukturen"

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ECTS: 8 Credit points

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Lectures:

4 SWS

Mon 10:00–12:00 (Room Interim2) Fri 10:00–12:00 (Room Interim2)

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Required knowledge:

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 - "Introduction to Informatics 1/2"
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 - "Diskrete Strukturen" (DS)



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 - ► IN0015
 - "Discrete Structures"
 - "Diskrete Strukturen" (DS)
 - ► IN0018
 - "Discrete Probability Theory"
 - "Diskrete Wahrscheinlichkeitstheorie" (DWT)

The Lecturer

- ► Harald Räcke
- Email: raecke@in.tum.de
- Room: 03.09.044
- Office hours: (by appointment)

Tutorials

```
Monday,
              12:00-14:00, 00.08.038
                                        (Michael Laraia)
  Monday,
              14:00-16:00, 02.09.023
                                        (Ruslan Zabrodin)
4 Tuesday,
              10:00-12:00, 00.08.053
                                        (Letian Shi)
  Tuesday,
              14:00-16:00, 00.08.038
                                        (Arnor Kristmundsson)
  Wednesday, 10:00-12:00, 03.11.018
                                        (Abdelrahman Metwally)
2 Wednesday, 12:00-14:00, online
                                        (Arnor Kristmundsson)
  Wednesday, 14:00-16:00, online
                                        (Abdelrahman Metwally)
 Thursday,
              16:00-18:00, online
                                        (Michael Laraia)
7 Friday.
              12:00-14:00. 00.13.009A (Ruslan Zabrodin)
```

Registration for Tutorials

Registration Period for Tutorial Sessions:

Saturday, 23 Oct- Tuesday, 26 Oct

via TUMonline; you have to choose at least 3 options...

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- This is done via Moodle.

Assignment sheets

In order to pass the module you need to pass an exam.

Assignment Sheets:

An assignment sheet is usually made available on Friday on the module webpage.

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- ➤ You should submit solutions in groups of up to 2 people.

Assignment Sheets:

Submissions must be handwritten by a member of the group. Please indicate who wrote the submission.

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- Don't forget name and student id number for each group member.

Assignment can be used to improve you grade

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$$f(x) = \begin{cases} \frac{1}{10} \text{round} \left(10 \left(\frac{\text{round}(3x) - 1}{3} \right) \right) & 1 < x \le 4 \\ x & \text{otw.} \end{cases}$$

Assignment can be used to improve you grade

If you obtain a bonus your grade will improve according to the following function

$$f(x) = \begin{cases} \frac{1}{10} \text{round} \left(10 \left(\frac{\text{round}(3x) - 1}{3} \right) \right) & 1 < x \le 4 \\ x & \text{otw.} \end{cases}$$

► It will improve by 0.3 or 0.4, respectively. Examples:

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 - **>** 3.3 → 3.0

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- It will improve by 0.3 or 0.4, respectively. Examples:
 - **▶** 3.3 → 3.0
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 - **▶** 3.7 → 3.3
 - **►** 1.0 → 1.0
 - > 4.0 no improvement

Assignment can be used to improve you grade

Requirements for Bonus

- 50% of the points are achieved on submissions 2-8,
- ▶ 50% of the points are achieved on submissions 9-14,
- each group member has written at least 4 solutions.

- Foundations
 - Machine models
 - Efficiency measures
 - Asymptotic notation
 - Recursion

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1 Contents

Cuts/Flows



- Foundations
 - Machine models
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 - Priority queues
 - Union/Find data structures
- Cuts/Flows
- Matchings



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2 Literatur



Thomas H. Cormen, Charles E. Leiserson, Ron L. Rivest, Clifford Stein:

Introduction to algorithms,

McGraw-Hill, 1990

Michael T. Goodrich, Roberto Tamassia:

Algorithm design: Foundations, analysis, and internet examples,
John Wiley & Sons, 2002



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2 Literatur



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Concrete Mathematics.

2. Auflage, Addison-Wesley, 1994



Volker Heun:

Grundlegende Algorithmen: Einführung in den Entwurf und die Analyse effizienter Algorithmen,

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Jon Kleinberg, Eva Tardos:

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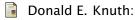
Donald F. Knuth:

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3. Auflage, Addison-Wesley, 1997



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Prentice Hall, 1982

Uwe Schöning:

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Steven S. Skiena:
The Algorithm Design Man

The Algorithm Design Manual, Springer, 1998



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